

Claims

1. Transport system for active substances containing hybrid particles comprising at least one layer of lipid molecules and at least one ligand, characterised in that the ligand is a peptide (5).
2. Transport system according to claim 1, characterised in that the lipid molecule (3) is bonded to the at least one ligand via a spacer unit (4).
3. Transport system according to claim 2, characterised in that the spacer unit (4) is made up of amino acids, a chemically inert substance, for example nano-particles such as carbon nano-tubes, nano-threads, colloids, etc..
4. Transport system according to one of the preceding claims, characterised in that the lipid molecules (3) are polymerisable lipids and/or “natural” lipids, for example, such as steroids, glycolipids, phospholipids, sphingolipids, poly-isoprenoids, etc..
5. Transport system according to one of the preceding claims, characterised in that the peptide (5) is an oligopeptide (6).
6. Transport system according to claim 5, characterised in that the oligopeptide (6) has a length selected from a range with a lower limit of 4 amino acids, preferably 5 amino acids, in particular 6 amino acids, and an upper limit of 18 amino acids, preferably 20 amino acids, in particular 22 amino acids.
7. Transport system according to claim 5 or 6, characterised in that the oligopeptide sequence is complementary to the sequence of a receptor on a cell.
8. Transport system according to one of claims 5 to 7, characterised in that the oligopeptide (6) has a sequence selected from a group comprising the sequences Gly-Arg-Gly-Asp-Ser-Pro (SEQ ID NO: 1), Tyr-Ile-Glu-Ser-Arg (SEQ ID NO: 2) and/or Ala-Asp-Gly-Glu-Ala (SEQ ID NO: 3).

9. Transport system according to one of claims 5 to 7, characterised in that the oligopeptide (6) has a sequence, selected from a group comprising the sequences Val-Arg-Leu-Leu-Asn-Asn (SEQ ID NO: 4), Val-Arg-Leu Leu-Asn-Asn-Trp-Asp (SEQ ID NO: 5), Gly-Arg-Val-Arg-Leu-Leu-Asn-Asn (SEQ ID NO: 6), Met-Thr-Ala-Gly-Ala-Gly (SEQ ID NO: 7), Leu-Ser-Gly-Ala-Leu-Arg (SEQ ID NO: 8), Ile-Val-Ala-Ile-Leu-Ile-Cys-Ile-Leu-Ile-Leu-Leu-Thr-Met-Val-Leu-Leu-Phe-Val-Met-Trp-Met (SEQ ID NO: 9), Ile-Val-Ala-Ile-Leu-Ile-Cys-Ile-Leu-Ile-Leu-Leu (SEQ ID NO: 10), Ile-Val-Ala-Ile-Leu-Ile-Cys-Ile-Leu-Ile-Leu-Leu-Thr-Met-Val-Leu-Leu-Phe (SEQ ID NO: 11), Ile-Val-Ala-Ile-Leu-Ile (SEQ ID NO: 12), Cys-Ile-Leu-Ile-Leu-Leu (SEQ ID NO: 13), Thr-Met-Val-Leu-Leu-Phe (SEQ ID NO: 14) and/or Leu-Phe-Val-Met-Trp-Met (SEQ ID NO: 15).

10. Transport system according to one of the preceding claims, characterised in that the hybrid particles (2) form 3-dimensional structures, such as vesicles, micro-spheres, nano-particles, tubes, etc..

11. Transport system according to one of the preceding claims, characterised in that at least one polymerisable group (9) is incorporated in the hybrid particles (2).

12. Transport system according to one of the preceding claims, characterised in that the active substance (10) is at least one micro-nutrient.

13. Transport system according to claim 12, characterised in that the at least one micro-nutrient is at least one substance selected from a group comprising provitamins, vitamins, minerals and trace elements, amino acids, fatty acids, polyphenols, hormones and organ extracts or their synthesis products, such as pancreatin, galenic acid, cartilaginous base substance, etc..

14. Transport system according to claim 12 or 13, characterised in that the vitamin is selected from a group comprising natural and synthetic compounds with a retinoid structure (vitamin A), vitamin B complex, ascorbic acids (vitamin C), calciferols (vitamin D), tocopherols (vitamin E), vitamin K, flavonoids and biotin.

15. Transport system according to one of claims 12 to 14, characterised in that the at

least one vitamin is selected from a group comprising retinol, retinyl acetate, retinyl palmitate, 3,4-didehydroretinol (vitamin A2), retinal, retinic acid and provitamins, such as α -, β -, γ -carotin, lutein, zeaxanthin, thiamin (vitamin B1) or thiamin hydrochloride or thiamin monomitate, riboflavin (vitamin B2) or sodium-riboflavin-5-phosphate, niacin (vitamin B3) or nicotinic acid or neacin, pantothenic acid (Vitamin B5) or calcium-D-pantothenate or sodium-D-pantothenate or D-panthenol, pyridoxin (vitamin B6) or pyridoxin hydrochloride or pyridoxin-5-phosphate or pyridoxin dipalmitate or pyridoxal phosphate, folic acid (vitamin B9) or pteroyl glutamic acid, cobalamin (vitamin B12) or cyano-cobalamin or hydroxycobalamin, biotin, choline, inositol and p-aminobenzoic acid, L-ascorbic acid, sodium-L-ascorbate, calcium-L-ascorbate, potassium-L-ascorbate and L-ascorbyl-6-Palmitate, ergocalciferol (vitamin D2), cholecalciferol (vitamin D3), 1,25-dihydroxy-cholecalciferol and the provitamins ergosterol or 7-dehydrocholesterol, D- α -tocopherol, DL- α -tocopherol, D- α -tocopheryl acetate, DL- α -tocopheryl acetate and D- α -tocopheryl acid succinate, phylloquinone (vitamin K1), menaquinone (vitamin K2), menadion (vitamin K3) and menadione hydroxiquinone (vitamin K4).

16. Transport system according to claim 12 or 13, characterised in that the at least one mineral and the at least one trace element are selected, according to their importance for the organism, from a group comprising Na, K, Mg, Ca, Fe, I, Cu, Mn, Zn, Co, Mo, Se, Cr, F, Si, Ni, As, Sn, V, P, Cl, B, Al and Br.

17. Transport system according to claim 12 or 13, characterised in that the at least one component is selected from a group comprising coenzyme Q-10, quercetin, bromelain, inositol, choline, pycnogenol, carnitine, taurine, mesoinositol.

18. Transport system according to claim 12 or 13, characterised in that the at least one essential amino acid is selected from a group comprising histidine, isoleucine, leucine, lysine, methionine, phenyl alanine, threonine, tryptophan, valine and arginine.

19. Transport system according to claim 12 or 13, characterised in that the at least one fatty acid is selected from a group comprising linoleic acid, linolenic acid and arachidonic acid.

20. Method of transporting active substances, characterised in that the transport system according to one of claims 1 to 19 is used.
21. Transport system according to one of claims 1 to 19 for use as a medicament.
22. Use of the transport system according to claim 21 for producing a medicament for the treatment of nutritional deficiencies.
23. Use of the transport system according to claim 22 for topical and oral application.
24. Use of the transport system according to claims 1 to 19, characterised in that it is used in the pharmaceutical and food industry.